LUMBAR SYMPATHECTOMY IN THE TREATMENT OF INTERMITTENT CLAUDICATION: AN OBJECTIVE STUDY

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Summary

Sympathectomy in twenty legs suffering from atherosclerotic peripheral vascular disease made no improvement in the muscle blood flow as detected objectively by the Technetium (^{99m}Tc) Clearance Technique in nineteen of these legs. It is postulated that intermittent claudicaion *per se* **is not an indication for sympathectomy although the operation may have a place in the treatment of early nutritional disturbances in the ischaemic leg.**

It is still a fairly widespread practice to submit patients who present with the symptoms of intermittent claudication to the operation of lumbar sympathectomy. It is the impression of some surgeons that many of these cases acquire worthwhile improvement in their symptoms. However, there is no objective evidence to support this view and indeed there is experimental evidence (Myers and Irvine, 1966a) that the operation should not be expected to allay the pain of intermittent claudication.

The object of this paper is to present the results of an objective study on a series of patients, all complaining of intermittent claudication (some also with rest pain and/or trophic skin changes) who were assessed both clinically and objectively using a radio-active tracer technique before and after they had undergone lumbar sympathectomy.

Material

Fifteen patients, all with occlusive peripheral arterial disease proved by arteriography, were studied. Five patients had symptoms in both legs so that, in all, this series comprises twenty limbs. All patients complained of intermittent claudication in one or both limbs, four patients (six legs) had rest pain while marked ischaemic (trophic) changes were present in ten legs.

Method

All legs were studied by recording muscle blood flow in the lateral gastrocnemius at rest and during exercise. The technique has been described elsewhere (Cutajar *et al.* 1971).

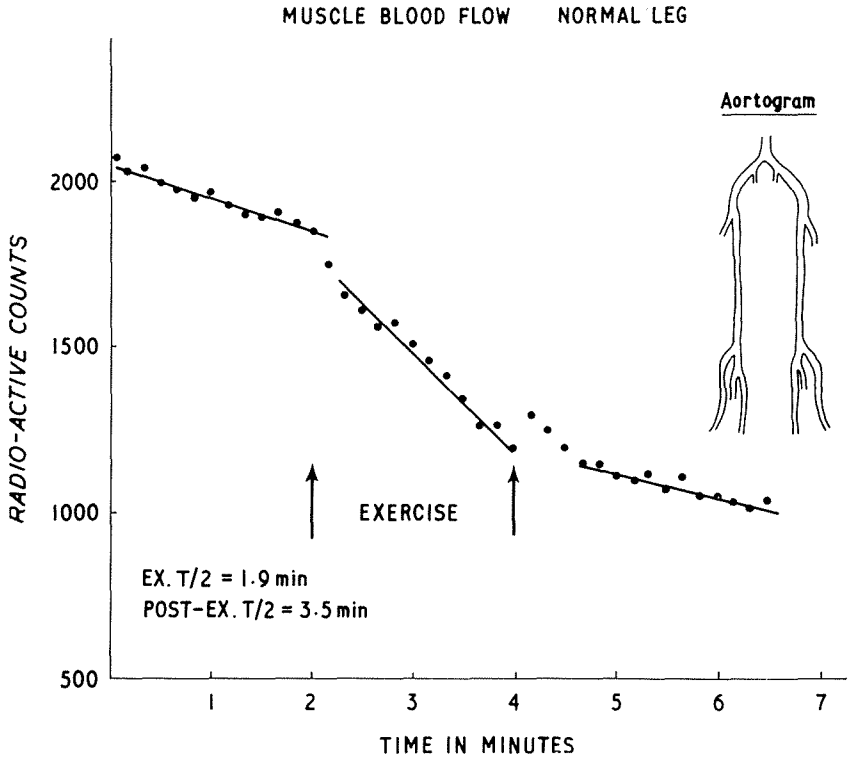
MUSCLE BLOOD FLOW NORMAL LEG
Aortogram
RADIO-ACTIVE COUNTS
2000
1500
1000
500
EXERCISE
EX. T/2 = 1.9 min
POST-EX. T/2 = 3.5 min
1
2
3
4
5
6
7
TIME IN MINUTES

Fig. 1

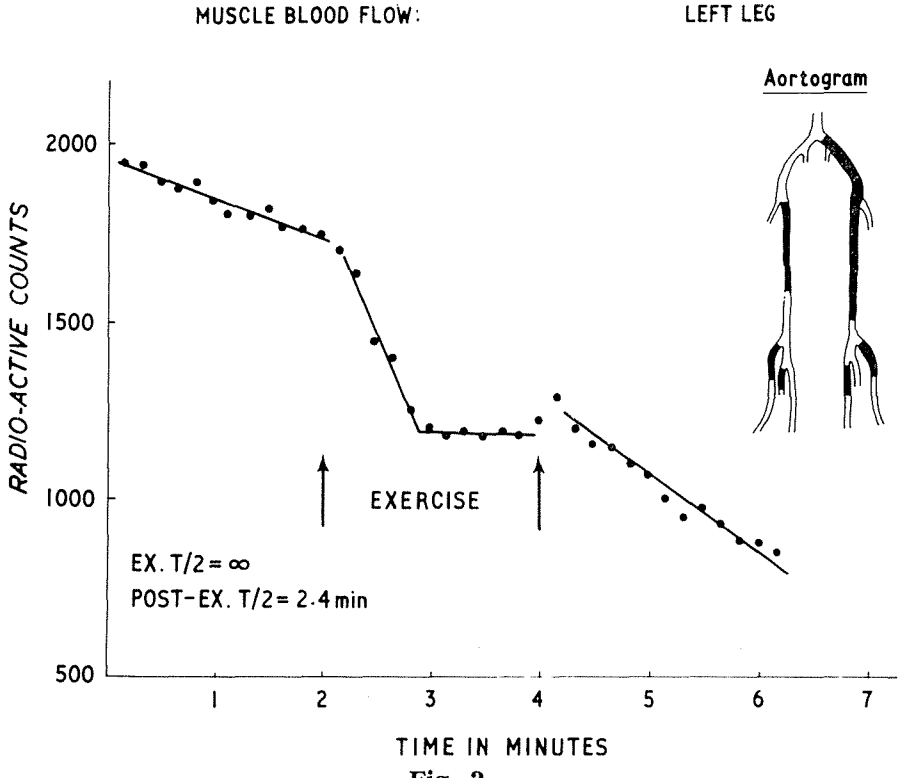
MUSCLE BLOOD FLOW:
LEFT LEG
Aortogram
RADIO-ACTIVE COUNTS
2000
1500
1000
500
EXERCISE
EX. T/2 = ∞
POST-EX. T/2 = 2.4 min
1
2
3
4
5
6
7
TIME IN MINUTES

Fig. 2

Briefly, the technique consists in injecting 100 μC of the radio-active isotope, TECHNETIUM (^{99m}Tc into the lateral gastrocnemius of the leg under observation. The clearance of the isotope is measured by means of a Geiger counter tube strapped directly over the site of the injection (fig. 1), the count-rate being recorded by an electronic rate-meter which is connected to a chart recorder which automatically plots the count rate against time thus giving a clearance curve. The experiment is conducted under various physiological conditions, i.e. with the patient at rest, during exercise and in the post-exercise period.

Fig. 2 shows a typical clearance curve in a leg with normal circulation. In the initial resting period there is a steady but comparatively slow clearance of ^{99m}Tc from the muscle. With the onset of exercise there is a sharp increase in clearance (and therefore in the blood flow) which persists throughout the whole exercise period. In the post-exercise period there is again a diminution in clearance, which gradually returns to the resting level.

In contrast fig. 3 shows what happens in a limb which is the site of an arterial occlusion due to atherosclerotic peripheral vascular disease. Whereas the clearance of ^{99m}Tc (and hence the blood flow) in the pre-exercise resting period is similar to that of the normal limb, there is considerable diminution in clearance in the claudicating limb during the period of exercise.

These clearance patterns were found to be so constant that it was possible to assess objectively the result of any form of surgery in a claudicating limb. For example, an abnormal muscle blood flow clearance curve was converted to a normal one following successful arterial reconstruction.

Results

In the present series, pre- and post-operative muscle blood flow curves were obtained in twenty limbs sympathectomised for peripheral arterial occlusion.

TABLE 1
Symptoms in 20 legs with P.V.D.

Int. claudication: 14.
Rest pain: 6.
Marked trophic changes: 10.

Table 1 describes the symptoms of the limbs under observation. All these limbs had an abnormal muscle blood-flow clearance (^{99m}Tc) curve prior to sympathectomy.

Post-operatively patients were questioned regarding their symptoms and all legs were studied objectively by repeating

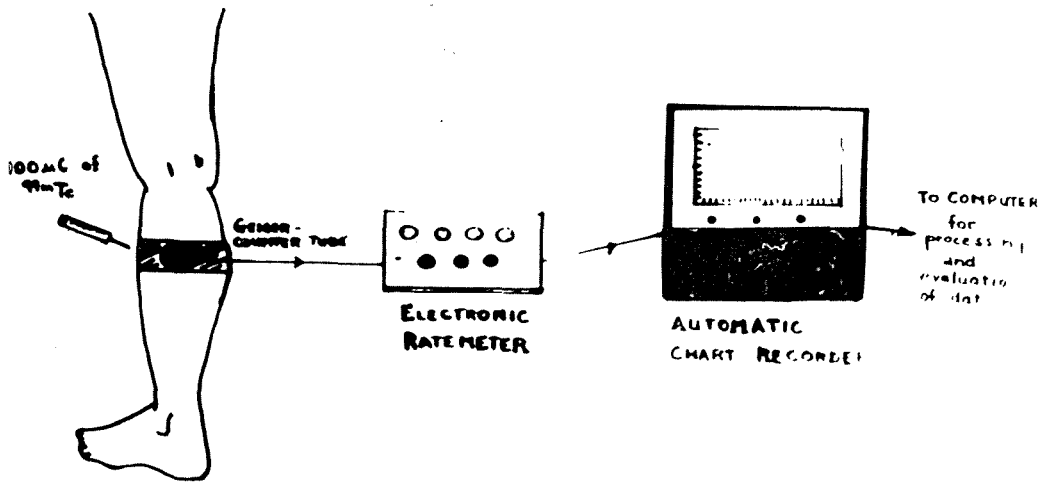

Fig. 3: Muscle blood flow studies by the Technetium (^{99m}Tc) clearance technique.

the clearance test. Table 2 shows the results of sympathectomy in these legs. It is obvious that although many patients felt that they had improved after the operation there was in fact no change in the actual muscle blood flow (as tested by the Technetium clearance technique) in the majority of the operated limbs.

TABLE 2

No. of Legs: 20 (15 patients).
Subjective improvement after Sympathectomy:
"Improved": 10 legs (inc. 4 with rest pain).
"Same": 6 legs.
"Worse": 4 legs.
Objective Change: only 1 leg showed a change in ^{99m}Tc Clearance to a normal pattern.

Discussion

The results obtained in this study seem to indicate that sympathectomy cannot be relied upon to augment blood-flow to ischaemic muscle to any important degree and that any improvement which there may have been in operated patients was more psychological than actual. This was also the conclusion of Myers and Irvine (1966a) and of Taylor and Calo (1962).

Consideration of the sympathetic innervation of the muscle circulation lends little support to the rationale of denervation. The nervous control of the muscle vessels is much less pronounced than for the skin circulation. At rest vasomotor tone in muscle is mainly determined by inherent myogenic tone in the arteriolar wall and under normal conditions the effect of the sympathetic vasoconstrictor innervation is minimal. Stimulation of sympathetic vasodilator fibres may increase muscle flow but only under situations of marked stress.

In contrast to the muscle circulation, there is a high level of sympathetic vasoconstrictor tone of skin vessels in the foot, and their sympathetic denervation initially results in marked vasodilatation (Myers and Irvine, 1966b). In the present series it was noted that there was often an improvement in early ischaemic cutaneous lesions of the affected leg and also of mild rest pain although the claudication pain was largely unaffected.

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